STATE OF WASHINGTON
Department of Labor and Industries

Electrical Plan Review
Submittal Guide

REVISION DATE: 01-17-2002

Table Of Contents

Introduction

The following pages describe the information we need in order to review your electrical plans and load data. We have provided instructions, sample forms, and schedules to demonstrate the proper format to use to present the supporting documentation. You may use our forms, or you may create your own. Our intention is to assist you in assembling an accurate presentation that will demonstrate that your design is in compliance with the appropriate codes.

The *"Electrical Plan Review Submittal"* form on page 9 must be enclosed (unaltered) with all plan submittals. If you would like this form in a electronic version please call Bruce Reynolds at (360) 902-5254. The information in items 1 through 10 is entered into our database and provides us the details needed to identify, track, and record your project. The documentation as outlined in the Screen In Check List must be presented in order for the plans examiner to begin a review. **Plans lacking this information will be immediately disapproved.**

Although we check the plans for compliance with many sections of the National Electrical Code, the main focus of our review is the load on the electrical system. Our review starts at the individual branch circuit and investigates all equipment and conductors in the load path back to the service point.

The Electrical Plan Review staff would like to hear any suggestions or concerns you may have about the review process. This information packet is a "live" document and can be updated to meet your needs. We welcome your constructive comments.

RCW and WAC Requirements for Electrical Plan Review

RCW 19.28 states that electrical installations *"shall be in conformity with approved methods of construction."* The standards used for *"approved methods"* are listed in WAC 296-46-090 and include the currently adopted editions of NFPA 70 (National Electrical Code), NFPA 20 (Centrifugal Fire Pumps), and NFPA 110 (Emergency and Standby Power Systems).

WAC 296-46A-130 provides classification or definition of occupancies. WAC 296-46-140 and 155 specify the occupancies for which plan review is required.

WAC 296-46A-140(2) requires that plans to be reviewed by the department *"shall clearly show the electrical installation or alteration in floor plan view, include switchboard and/or panelboard schedules and when a service or feeder is to be installed or altered, shall include a riser diagram, load calculation, fault current calculation and interrupting rating of equipment. Where existing electrical systems are to supply additional loads, the plans shall include documentation that proves adequate capacity and ratings."*

Riser diagrams and load calculations must include all of the equipment carrying the additional loads and be complete to the point of connection between the facilities of the serving utility and the premises wiring. NEC 215-5 requires that the details of such diagrams and calculations shall include *"the area in square feet of the building or other structure supplied by each feeder, the total connected load before applying demand factors, the demand factors used, the computed load after applying demand factors, and the size and type of conductors to be used."*

WAC 296-46A-140(1) states *"Plan review is a part of the electrical inspection process; its primary purpose is to determine that loads are calculated per the proper NEC or WAC article or section and that conductors and equipment are adequately sized and rated to the calculated load."* The Electrical Plans Examiner's responsibility is to review plans for electrical installations to verify compliance with the National Electrical Code and Washington State Rules and Regulations.

For the latest Electrical RCW and WAC rules please check our web site at: www.lni.wa.gov/scs/electrical

Electrical Plan Review Staff

Phone Numbers and Mailing Address

Please direct all billing calls and plan status checks to Bruce Reynolds.
The plan review supervisor will address technical or plan review policy questions.

Chief Electrical Inspector:
Ron Fuller
Telephone Number: 360.902.5249
Fax Number: 360.902.5229

Plan Review Supervisor:
Bruce Reynolds
Phone number: 360.902.5254
Fax Number: 360.902.5229

Plans Examiner:
John Wiatrak
Phone number: 360.902.5248
Fax Number: 360.902.5229

Plans Examiner:
Mike Buettner
Phone number: 360.902.5253
Fax Number: 360.902.5229

Plans Examiner:
Peter Okada
Phone number: 360.866.9309
Fax Number: 360.867.0169

Plans Examiner:
(Temporary Position)
Phone Number: 360.902.5247
Fax Number: 360.902.5229

Please address all mail to: Electrical Plan Review
Attn.: Bruce Reynolds

Street Address: 7273 Linderson Way SW
Tumwater, WA 98502

Mailing Address: PO Box 44460
Olympia, WA 98504-4460

Plan review fees are based on a percentage of the electrical inspection fee that is calculated during the review. You will be billed for the plan review fee after the review is completed.

Plans Examiner Geographical Areas

Individual plans examiners are assigned to the following counties:

Bruce Reynolds:
San Juan Islands, Whatcom, Skagit, Snohomish, and Okanogan

Mike Buettner:
King, Chelan, Douglas, and Grant

John Wiatrak:
Ferry, Stevens, Pend Oreille, Lincoln, Spokane, Adams, Whitman, Walla Walla, Columbia, Garfield, and Asotin

(Temporay Position) Will be distributed to others when not filled:
Grays Harbor, Mason, Thurston, Pacific, Lewis, Wahkiakum, Cowlitz, Clark, Skamania, Klickitat, Benton, and Franklin.

Peter Okada:
Clallum, Jefferson, Pierce, Kittitas, Kitsap, and Yakima

Plan Review in Cities Doing Electrical Inspections

If the project you are submitting is within the inspection jurisdiction of the cities listed on page 8, Labor and Industries **does not** do the plan review. You will have to submit your plans to the city responsible for the electrical inspection.

Labor and Industries Service Locations 2002

ABERDEEN
415 W Wishkah STE 1B
Aberdeen WA 98520-0013
360.533.8200
Fax: 360.533.8220
● Electrical Supervisor
Bob Thomas 360.902.5201 **MS 4814**

BELLEVUE
616 120th Ave. NE #C201
Bellevue WA 98005-3037
425.990.1400
Fax: 425.990.1446
● Electrical Supervisor
Dick Gilcrist 425.990.1420 **NB75**

BELLINGHAM
1720 Ellis St. STE 200
Bellingham WA 98225
360.647.7300 or 7320
Fax: 360.647.7310
● Electrical Supervisor
Dennis Patterson 360.647.7331 **BHAM**

BREMERTON
500 Pacific Ave. STE 400
Bremerton WA 98337
360.478.4921
Fax: 360.415.4048
● Electrical Supervisor
Doug Eaton 360.415.4015 **WB07**

COLVILLE
298 S Main STE 203
Colville WA 99114-2416
509.684.7417
Fax: 509.684.7416
● Electrical Supervisor
Jerry Clark 509.324.2532 **SPOK**

EVERETT
729 100Th St SE
Everett WA 98208-2620
425.290.1300
Fax: 425.290.1399
● Electrical Supervisor
Jim Hinrichs 425.290.1320 **TB26**

KENNEWICK
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Kennewick WA 99336-2607
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Fax: 509.735.0120
● Electrical Supervisor
Dene Koons 509.735.0130 **KENN**

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Longview WA 98632
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Fax: 360.575.6918
● Electrical Supervisor
Steve Thornton 360.896.2356 **S14**

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Moses Lake WA 98837-2907
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Fax: 509.764.6923
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David Whittle 509.454.3763 **OKAN**

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Mt. Vernon WA 98273-5500
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Fax: 360.416.3030
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Okanogan WA 98840-0632
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PULLMAN
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● Electrical Supervisor
Jerry Clark 509.324.2532 **SPOK**

SPOKANE
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Spokane WA 99201-2149
509.324.2640
Fax: 509.324.2655
● Electrical Supervisor
Jerry Clark 509.324.2532 **SPOK**

TACOMA
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Fax: 253.596.3956
● Electrical Supervisor
Mike Vert 253.596.3815 **WT21**

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Tukwila WA 98168
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E. Wenatchee WA 98802-5459
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David Whittle 509.454.3763 **OKAN**

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David Whittle 509.454.3763 **YAKI**

Last Updated 1/11/02 rj

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DEPARTMENT OF LABOR & INDUSTRIES

Electrical Plan Review Submittal

L&I USE ONLY

1. Project:	**2. Project Address (Street Address and City):**	
3. Submitter Name and Mailing Address (Federal Express):		
4. Project Owner:	**5. Is the facility licensed by DOH or DSHS?** ❑ **YES** ❑ **NO** **If YES, how is it licensed?:**	
6. Electrical Design Contact Person:	**Telephone Number:** (_ _ _) _ _ _-_ _ _ _	**Fax Number:** (_ _ _) _ _ _-_ _ _ _
7. General Job Description: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____		
8. Proposed Construction Start Date:	**9. Proposed Construction Completion Date:**	
10. SPI Funded School Project? ❑ **YES** ❑ **NO** **If YES, proposed bid date:** _____	**School District:**	

Has the Plan Review Screen In Check List been reviewed and included ☐

(Following this procedure will expedite the review process and plan approval. Missing items may cause the presentations disapproval and added fees charged)

1. **Project:**
   Name of the facility.

   EXAMPLE: Mukilteo Elementary School

2. **Project Address:**
   Facility (inspection) address as assigned by local building or planning department. Include the city in which the project is located.

   EXAMPLE: 1101 First Ave - Moses Lake, WA 98555

3. **Submitter Address:**
   Address of the person or firm submitting the plans for review. Please give the proper address for Federal Express delivery.

   EXAMPLE: Sparling - 110 First Ave NE - Seattle, WA 98555

4. **Project Owner:**
   Name of the person, corporation, or agency that is the registered owner of facility.

   EXAMPLE: Mukilteo School District

5. **Is this project licensed through Department of Health (DOH) or a contracted service with the Department of Social and Health Services (DSHS)?**
   What type of facility license is it? Boarding home, Nursing home, etc?

   EXAMPLE: (If applicable) Boarding Home

6. **Contact Person (including phone and Fax numbers):**
   The electrical designer or individual that can answer technical questions on electrical plans, load calculations, panel schedules, etc.

   EXAMPLE: Ed Stanton 206.555.5555 Fax: 206.555.5555

7. **General Description:**
   Provide a detailed description of the complete scope of electrical work being done; indicate whether project is new construction, addition, remodel, etc.

   EXAMPLE: Portable classroom additions to the school electrical system.

8. **Start Date:**
   Date electrical work starts.

9. **Completion Date:**
   Date project is scheduled for completion.

10. **SPI Funding Information**
    Does the project have state matching funds from the Office of the Superintendent of Public Instruction? If so, Bid Date and School District.

    EXAMPLE: June 30, 1997 Mukilteo School District

Electrical Plan Review Screen In Check List

The following three pages contain a checklist that will be used by the assigned plan reviewer to screen in your presentation. Completing this checklist may require as little as a few minutes on very small projects such as a school portable, or as much as three to four hours for very large, complex facilities.

The intent of this process is to weed out and disapprove submittals that have multiple errors before the reviewer has spent many hours of review time on the review.

Please be aware that the **Electrical Plan Review is not to be used as quality control for drafting errors, but is intended to be a review process for code compliance of the electrical system.** If projects are disapproved during this process, you will be charged for the review time spent (with a one-hour minimum) and your plans will be shipped back to you along with our comments. When we receive your presentation back after a disapproval your review will go to the bottom of our pending work.

Your final approved plans will not be shipped until this fee, plus the approved plan review fees, have been paid in full. Our goal is to have presentation submittals that are accurate enough so that we can spot check branch circuits without having to look at every circuit on the plans.

It is strongly suggested that you use this checklist prior to shipping us your presentation to see if it meets all of the items on the list. By following this procedure we will receive a product that can be reviewed in a short time frame, and you will receive your approved plans in quick order without inspection delays.

Electrical Plan Review Screen In Check List

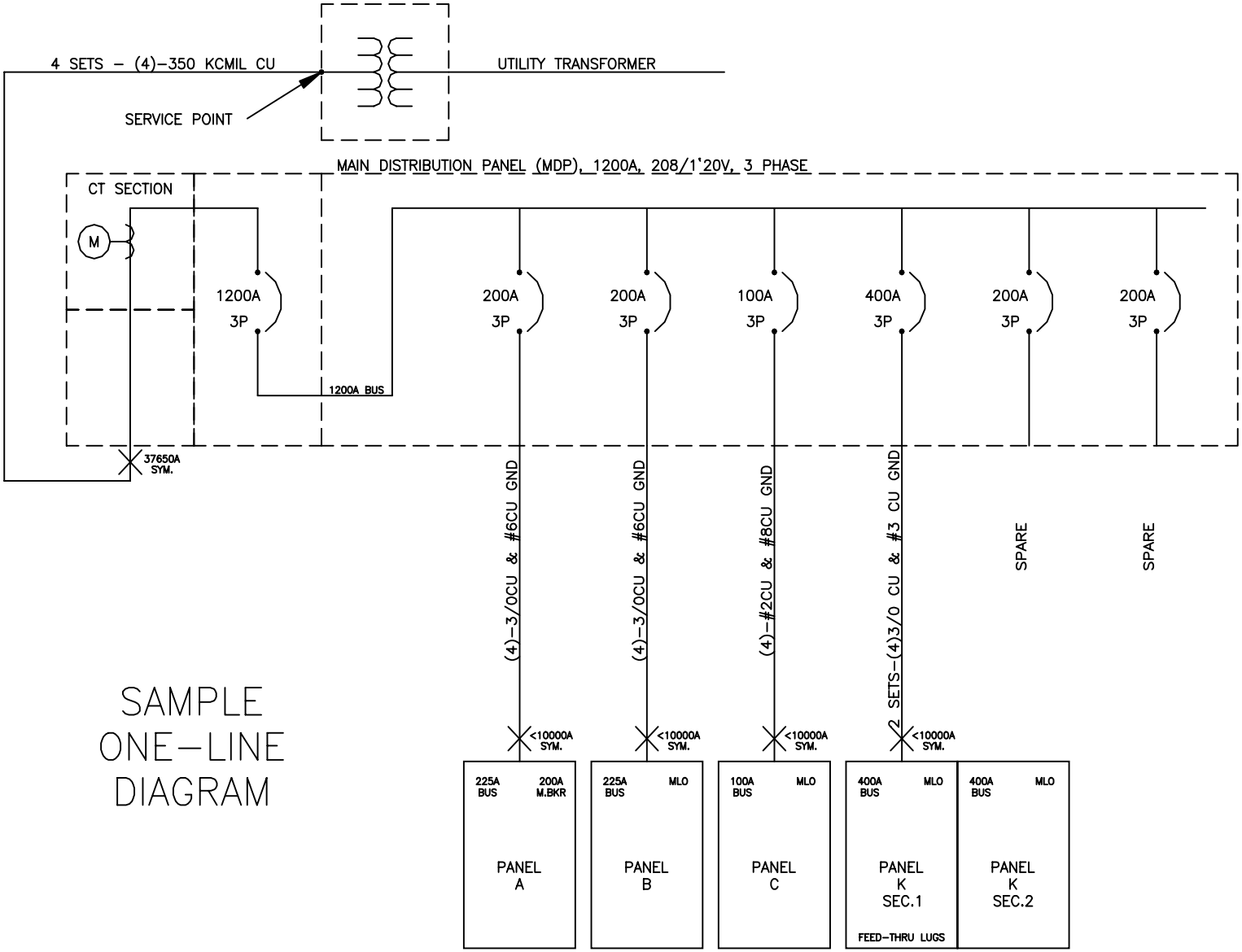
- ❑ **Type Of Facility Identified** (Educational, Institution, Health Care, or Other)
  - ❑ **If Health Care, How It Is Licensed By The State Of Washington?**
  - ❑ **Electrical Engineers Stamp And Signature, As Required By WAC, On Educational, Hospital, and Nursing Home Drawings**
  - ❑ **Is The Facility Required To Have Electrical Plan Review?**
  - ❑ **Location Of Facility** (Is it in the States jurisdiction or a cities jurisdiction)
- ❑ **One Line/Riser Diagram** (Shown back to service point)
  - ❑ **Conductor Sizes**
  - ❑ **Service Point Per NEC 100 Identified**
  - ❑ **Fault Currents Tagged**
- ❑ **Check Plans For Classified (Hazardous) Locations Per NEC 500**
  - ❑ **If Hazardous Locations Present Must Have Documentation Per NEC 500-3(b)** (Normally from Fire Marshals Office)
- ❑ **Hazardous Locations Shown On Plans**
- ❑ **Specifications** (Optional) For information only.
- ❑ **Load Calculations** In va or kva out two decimal points.
  - ❑ **Load Break Out Per NEC 220 Categories**
- ❑ **Computer Receptacles Not Under General Use Receptacle Demand**

Electrical Plan Review Screen In Check List

- ❑ **Correctly Used Categories For Occupancy** (dwelling units, hospital rooms, etc)
- ❑ **Demand Calculations**
  - ❑ **Demand Records** Utility last 12 months or 30 day.
  - ❑ **Power Factor Correction**
  - ❑ **Seasonal and Occupancy Adjustments**
  - ❑ **30 Day Demand Validity Statement with Signature** (Licensed Engineer or Electrical Administrator)
  - ❑ **Date of Measurements**
  - ❑ **Diagram Showing Point of Metering**
- ❑ **Spot Check Load Calculations to Panel Schedules for Overloads**
- ❑ **Fault Current Calculations For Complete System or**
  - ❑ **Note That Will Be Listed Series Rated System**
- ❑ **Panel Schedules For All Panels With Load Increase** with accurate loads shown in va or kva out two decimal points.
- ❑ **Before and After Panel Schedules for Load Reductions**
- ❑ **Lighting Fixture Schedule With Input va Listed For Each Fixture Type**
- ❑ **Check for no multi-point grounding on systems 1 kv and over or compliance with Policy 01-06**

Electrical Plan Review Screen In Check List

- ❑ **Mechanical Equipment Schedule With Electrical Load Information or**
  - ❑ **Mechanical Equipment Load Information On The Plans**
- ❑ **Kitchen Equipment Schedules With Electrical Load Information**
- ❑ **Shop Equipment Schedule With Electrical Load Information**
- ❑ **Min. 1/8" Scale, Separate, Power Plans With Connecting Lines And Home Runs** (Additional hourly fees may be required for added review time for other than this format. This also applies to the next item also.)
- ❑ **Min. 1/8" Scale, Separate, Lighting Plans With Connecting Lines, Home Runs, and Fixtures Identified By Type Electrical Site Plan**
- ❑ **Random Check Of Branch Circuits On Each Sheet For Accurate Load As Compared To Panel Schedule**
- ❑ **Check Lighting Plans For Battery Backup Fixtures Off Normal Lighting Circuit For Area Served**
- ❑ **Random Check Of One Line Diagram And Panel Schedule For Correct Overcurrent Protection On Service Conductors**
- ❑ **Random Check Of One Line Diagram And Panel Schedules For Correct Overcurrent Protection On Secondary Of Transformers**
- ❑ **Check One Line Diagram And Panel Schedules For Correct Separation Of Emergency And Backup Power Systems**
- ❑ **Check For Identification of Generator Power System NEC ☐700, ☐701, ☐702, or ☐ 517**
- ❑ **Check One Line Diagram And Site Plan For Correct Building Disconnects**



SAMPLE
ONE–LINE
DIAGRAM

REVISION DATE: 01-17-2002

PANEL LOAD CALCULATION WORKSHEET

Project:_____Date ____/____/____

Panel ID: _____

LOAD TYPE	CONNECTED LOAD	CODE DEMAND FACTOR		CALCULATED DEMAND LOAD
Lighting	_____	X 125%	=	_____
General-use Receptacles (First 10KVA)	_____	X 100%	=	_____
General-use Receptacles (Over 10KVA)	_____	X 50%	=	_____
Motors and Compressors	_____	X 100%	=	_____
(Largest Motor Load)	(_____)	X 25%	=	_____
Dedicated or Specific-use Receptacles	_____	X 100%	=	_____
HVAC and Mechanical Equipment Loads	_____	X 100%	=	_____
Kitchen Equipment (#___)	_____	X ___%	=	_____
Miscellaneous Loads	_____	X 100%	=	_____
_____	_____	X ___%	=	_____
_____	_____	X ___%	=	_____
_____	_____	X ___%	=	_____
❑ 240/120 ❑ 3Ø ❑ 208/120 ❑ 1Ø ❑ 480/277 ❑ _____ System Voltage	TOTAL CONNECTED LOAD			TOTAL CALCULATED LOAD
				TOTAL CALCULATED AMPS

Connected Load-

1. The nameplate rating of all appliances that are fastened in place, permanently connected, or located to be on a specific circuit. (Water heaters, space heaters, ranges, refrigerators, etc.)
2. 180 VA for each general-use receptacle.
3. Maximum VA of lighting fixtures.
4. VA of all motors based on full load amps from table 430-147, 148, 149 and 150 of the National Electrical Code.

Calculated Demand Load-

The connected load after any code required adjustment factor has been applied. Load calculations shall be submitted/expressed in VA and converted to amps when sizing feeders and equipment.

Panel ID: _____

Location: _____

Fed From: _____

PANEL SCHEDULE

Single Phase

Bus Rating:_____A

❑ Main Breaker _____A
❑ Main Lugs Only
❑ Fed-Thru Lugs
❑ Double Lugs

Single Phase
❑ 4-wire
❑ 3-wire
❑ Iso. GND

Voltage
❑ 240/120
❑ 208/120
❑ _____

Panel A.I.C. Rating: ❑ 10 K ❑ 14 K ❑ 18 K ❑ 22 K ❑ 25 K ❑ 42 K ❑ 65 K ❑ 100 K ❑ 150 K ❑ 200 K

Circuit Description		LOAD(VA)	Code	Breaker	BUS	Breaker	Code	LOAD(VA)	Circuit Description	
1					A					2
3					B					4
5					A					6
7					B					8
9					A					10
11					B					12
13					A					14
15					B					16
17					A					18
19					B					20
21					A					22
23					B					24
25					A					26
27					B					28
29					A					30
31					B					32
33					A					34
35					B					36
37					A					38
39					B					40
41					A					42

Code Description:
L = LIGHTING LOADS
M = TOTAL MOTOR LOAD
H = HVAC
LM = LARGEST SINGLE MOTOR
R = GENERAL USE RECEPTACLES
S = DEDICATED RECEPTACLES
K = KITCHEN EQUIPMENT
Z = MISC OR APPLIANCES

REVISION DATE: 01-17-2002

Panel ID: _____

Location: _____

Fed From: _____

PANEL SCHEDULE

Three Phase

Bus Rating:_____A

❑ Main Breaker _____A
❑ Main Lugs Only
❑ Fed-Thru Lugs
❑ Double Lugs

Three Phase
❑ 4-wire
❑ 3-wire
❑ Iso. GND

Voltage
❑ 480/277Y
❑ 208/120Y
❑ 240/120Δ
❑ _____

Panel A.I.C. Rating: ❑ 10 K ❑ 14 K ❑ 18 K ❑ 22 K ❑ 25 K ❑ 42 K ❑ 65 K ❑ 100 K ❑ 150 K ❑ 200 K

Circuit Description		LOAD(VA)	Code	Breaker	Ø	Breaker	Code	LOAD(VA)	Circuit Description	
1					A					2
3					B					4
5					C					6
7					A					8
9					B					10
11					C					12
13					A					14
15					B					16
17					C					18
19					A					20
21					B					22
23					C					24
25					A					26
27					B					28
29					C					30
31					A					32
33					B					34
35					C					36
37					A					38
39					B					40
41					C					42

Code Description:
L = LIGHTING LOADS
M = TOTAL MOTOR LOAD
H = HVAC
LM = LARGEST SINGLE MOTOR
R = GENERAL USE RECEPTACLES
S = DEDICATED RECEPTACLES
K = KITCHEN EQUIPMENT
Z = MISC. OR APPLIANCES

REVISION DATE: 01-17-2002

DISTRIBUTION CALCULATION WORKSHEET

Date: _____

Name: _____

Address: _____ Inspection Office: _____

Project Description: _____

LOAD TYPE											CONN. TOTAL	%	CALC. TOTAL
Lighting Loads												x125%	
General use Receptacles≤10 KVA												x100%	
General use Receptacles>10 KVA												x50%	
Motors and Compressors												x100%	
(Largest Motor)	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	x25%	
Specific-use Receptacles												x100%	
HVAC Equipment and Mechanical												x100%	
Kitchen Equipment												x____%	
Miscellaneous or Appliances												x100%	
												x____%	
												x____%	
CONNECTED LOAD													
CALCULATED LOAD													
AMPS													

PEAK DEMAND CALCULATION WORKSHEET
NEC 220-35 and WAC 296-46-140(4)

The following calculation format meets the requirements of WAC 296-46-140(4)

1.	**Recorded Peak Demand**	**=**		KW
	on Date: _ _ / _ _ / _ _			
2.	Power Factor	**÷**		(P.F.)
	Apparent Peak Demand	**=**		KVA
3.	NEC 220-35 adjustment factor	**X**	**1.25**	
	Adjusted Peak Demand			KVA
4.	Seasonal adjustment factor ✹	**X**		
	Seasonally Adjusted Peak Demand	**=**		KVA
5.	Occupancy adjustment factor ✹	**X**		
	Occupancy Adjusted Peak Demand	**=**		KVA
6.	Other adjustment factor(s) ✹	**X**		
	Annual Peak Demand	**=**		KVA
7.	**New Calculated Load Added**	**+**		KVA
	Metered demand based CALCULATED LOAD:			**KVA**
				AMPS

Note: See WAC 296-46-140 for additional metering requirements.

✹ Explain how the factor was derived for 30-day demand metering.

Seasonal _____

Occupancy _____

Other _____

Identification of APPROVED PLANS

WAC 296-46-140 requires that "approved" plans shall be available on the job site for use during the electrical installation or alteration and for use by the electrical inspector. The following illustrations represent the appearance of the approval stamps currently in use by the Labor and Industries Electrical Plans Examiners.

The large stamp below will be placed on the cover sheet of the complete plan package, on the first sheet of the electrical plans, or on both. It may be stamped with red or black ink. The signature of the electrical plans examiner will be on the approval stamp.

☒ **APPROVED**-Means that the plans have been approved as submitted without corrections.

☒ **REJECTED**-Means that the plans have <u>not</u> been approved and are invalid.

☒ **APPROVED AS NOTED**-Means that the plans have been approved and the plans examiner has included notes, intended for the electrical inspector, that describe corrections or changes in the original design submittal. These notes are always written or highlighted in RED INK and individually initialed by the plans examiner. Compliance with these notes is mandatory and a condition of the plan approval.

DEPT. OF LABOR & INDUSTRIES
Electrical Plan Review

☐ APPROVED _____
PLANS ☐ REJECTED _____
☐ APPROVED AS NOTED **SEP 14 1998**
BY *Examiner's Signature*
Plans Examiner
SUBJECT TO PERMIT FEE _____
PROJECT SUBJECT TO CODE AND FIELD INSPECTION

The small stamp below will be placed on <u>each</u> approved electrical plan sheet. It may be stamped with red or black ink. The signature of the electrical plans examiner will be on each approval stamp.

STATE OF WASHINGTON
DEPT. OF LABOR AND INDUSTRIES
ELECTRICAL PLAN REVIEW SECTION
APPROVED

SEP 14 1998

SUBJECT TO CODE
AND FIELD INSPECTION
BY *Examiner's Signature*

All plan sheets, specifications, calculations, and other materials are stamped with the electrical plan review number: